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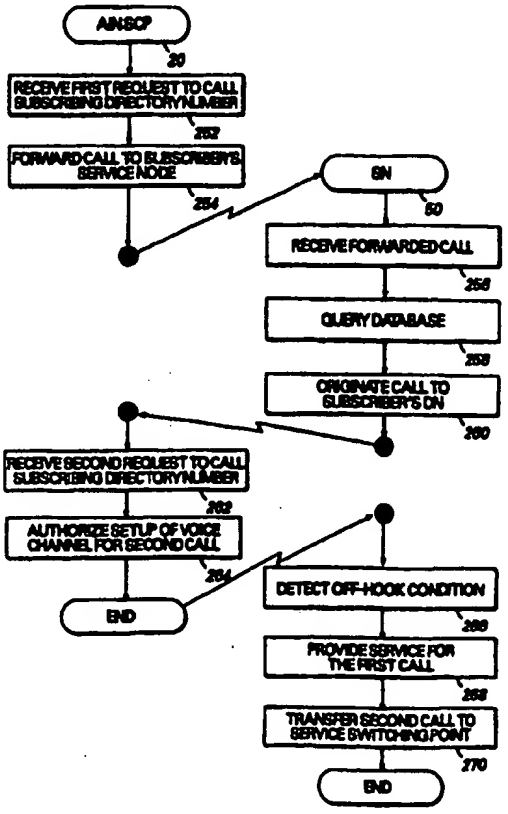
(57) Abstract

A system and a method for providing a network-based service with respect to a call associated with an originating and subscribing party. Audio Calling Name and other similar services may be provided as Advanced Intelligent Network (AIN) based services which may be subscribed to similarly to other enhanced services. The preferred embodiment includes an AIN service control point which receives a first request to call a subscriber's directory number (252) and responds by forwarding the call to a service node (254). The service node queries its database (258) to determine the name of the calling party. The service node originates a service call to the subscriber at the same directory number (260) as the first call. The AIN service control point detects and receives a second request to call the subscriber's directory number (262), recognizes the second request as a service call, and authorizes a channel to be established for the service call (264). Upon detecting that the subscriber answered the service call (266), the service node performs the network-based service (268) over the channel and then transfers the first call back to the AIN network (270). The network then completes a voice channel for the first call between the equipment used by the originating party and the subscriber's termination equipment.



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"A SYSTEM AND A METHOD TO PROVIDE AN AUDIO CALLING NAME SERVICE IMPLEMENTED THROUGH AN ADVANCED INTELLIGENT NETWORK"

Technical Field

The present invention relates to the field of switched telephony, and in particular, relates to the provision of an announcement to a called party independently of the type of call termination equipment the called party utilizes.

Background of the Invention

The advent of calling party identification brings a definitive answer to the perennial question posed by the musical group Men at Work, "Who can it be now?" Calling party identification has done for the telephone what the peephole has done for the front door. No longer do we have to sit and stare at a ringing telephone, blinking our eyes like toads in a hail storm, wondering who it is that is "reaching out to touch someone". In a nutshell, calling party identification is a system that provides a called party with the number or identification of the calling party prior to answering the phone. Thus, the called party may use discretion in determining which calls to accept.

In order to have calling party identification, an individual must become a subscriber to the service. In addition, the subscriber must purchase new termination equipment (i.e. a telephone) that is compatible with the calling party identification service. Alternatively, the subscriber can purchase a calling party identification box and install this box in series with the current termination equipment. The calling

party identification compatible equipment performs the task of detecting and displaying the number of the calling party. Thus, when a subscriber's telephone begins to ring, the subscriber can read the display on the calling party identification equipment to identify the number and/or name of the calling party.

The utility of current implementations of calling party identification service is limited. As an example, a typical subscriber will have several sets of termination equipment attached to a single telephone line. It would be very costly to modify or replace each piece of termination equipment, and thus, most subscribers will only attach a single piece of calling party identification compatible equipment to the telephone line. When an incoming call is received, the subscriber must examine the display on this equipment. This diminishes the usefulness of the calling party identification feature because it may be inconvenient or impractical for the subscriber to return to the calling party identification equipment each time the telephone rings. This inconvenience is even more readily observed in view of the technological advances in cordless telephones. These advances have allowed the cordless telephone user to travel further and further away from the base station. The base station houses the equipment to detect and display the number of the calling party, and thus, the cordless phone increases the inconvenience of present day calling party identification systems.

The present invention is a system and method to provide a network-based service to subscribers. In the preferred embodiment, the network based service is provided independently of the type of termination equipment the subscriber utilizes. In one embodiment of the invention, the network-based service includes an audio calling party identification service or Audio Calling Name. In this embodiment, Audio Calling Name can be offered as a service to all users of the public switched telephone network without requiring the customers to purchase or modify any equipment. Because Audio Calling Name is based on the public switched telephone network, it is necessary to first examine the structure of that network in order to fully appreciate the present invention.

Historical Development of the PSTN

In the slightly more than a century of having telephone service available in the United States, the public switched telephone

network (PSTN) has constantly evolved and grown in complexity, size, and capabilities. From the days in which calls were routed by a human operator working a plug board to switch and complete calls, the capacity of the system in both volume of traffic and service options has expanded greatly. The human operator has been replaced by a central office which houses a central office switch. The central office supports multiple subscriber lines, each of which may be attached to several pieces of termination equipment. Additionally, the central office has multiple trunk circuits connecting it to other central offices. Other trunk circuits are provided to customers, such as trunks feeding a private branch exchange (PBX) switch in a business office. The central office performs a switching function to connect either two local subscriber lines, a local subscriber line with an outgoing trunk or two trunks. As the telephone system continued to grow and more central offices were developed, the interaction between the central offices grew more complex.

In the late 1970s and early 1980s, American Telephone & Telegraph Company (AT&T) developed an early species of Common Channel Interoffice Signaling (CCIS) to be utilized in networking the central office's together. CCIS is essentially a network architecture for a switched telephone network in which information about a telephone call is transmitted over high speed data links that are separate from the voice circuits used to transmit the audio signals. Early in the development of CCIS, it was recognized that the interoffice data signaling links could be designed to provide high speed digital data that could first determine whether a call could be completed prior to assigning trunk capacity to set up the voice link. Thus, if a caller in Atlanta is dialing a number in Seattle, the identity of the called number can be transmitted over the interoffice signaling data links from the originating central office in Atlanta to the terminating central office in Seattle. The terminating central office services the called number. If the called number is busy, data providing this information is transmitted over the interoffice signaling link to the originating central office in Atlanta. In response to receiving this data, the originating central office will provide an audible busy signal over a local voice channel to the calling party. Therefore, no long distance trunk capacity is occupied during this process and the voice circuits between Atlanta and Seattle that formerly would have been used in attempting to complete the call, remain free for other uses. If the

called number in Seattle is not busy, various devices in the network respond to the information about this call to assign interoffice trunks to set up a connection for the call, and it is then completed.

The public switched telephone network evolved in the 1980s to a complex and very versatile system, most of which supports and is controlled by a form of CCIS. In addition, most of the complex functions have been centralized into specific processing units, where as the more simplistic functions such as basic call setup and tear down, have remained distributed throughout the network. This type of network is known in the telephony industry as an Advanced Intelligent Network (AIN). The basic architecture of the switched telephone network is, in significant parts, identical throughout the United States and the developed industrialized world including western Europe and Japan. The specifics of the current network described in this specification are those employed by the Regional Bell Operating Companies (RBOC's) and other local exchange carriers operating in the United States.

Modern interoffice signaling takes place over digital links using a CCIS protocol referred to as Signaling System 7 (SS7). The AIN may be thought of as a super set of existing interoffice equipment utilizing the SS7 protocol to communicate amongst the various network elements. The AIN performs call arbitration, routing, call setup, call tear down and other functions by utilizing the packet switching capabilities of telephone system's infra-structure to route data packets in conformance with the SS7 protocol. These data packets contain the necessary information to perform the requested functions and are routed independently from the actual voice channels that are ultimately set up between various callers. When a specific function is requested, AIN messages and triggers are encountered. A trigger is a particular event that generates a new AIN message sequence which is ultimately intended to satisfy the requested function. For example, if a party picks up a telephone and dials a number, prior to call completion, a trigger is encountered to indicate this action (i.e., Termination Attempt Trigger)

In the modern intelligent public switched telephone network, the same signaling capabilities described above for basic call set up, tear down and routing, are also used for providing enhanced custom calling features, controlling the operation of billing equipment, and maintaining billing records. For example, enhanced custom calling features that

relate to inbound calls, such as "CRISISLINK" which is disclosed in patent application 08/511,743 filed on August 7, 1995, normally require the customer for that directory number to subscribe to a Termination Attempt Trigger (TAT). Customers of the local exchange carriers must pay a tariff for having triggers provided to the AIN in connection with particular trigger events. The triggers for inbound calls operate by generating an AIN message whenever the network detects that some party has attempted to place a call to that particular directory number. An AIN component then consults its databases to determine what non-standard response may be appropriate for the handling of the call given that a trigger was received.

In order to understand the implementation of the present invention, it is first necessary to understand the fundamental architecture and intercommunications of the modern AIN. Fig. 1 of this specification is a block diagram representing a simplified subset of the public telephone switching network and the AIN components associated therein. The components that are included in Fig. 1 are well known to those skilled in the art and each of the components shown in Fig. 1 will be described briefly below.

AIN Components

A Service Switching Point (SSP) **40-42** is the AIN equivalent of the modern central office switch. The PSTN has a conglomeration of both SSP and non-SSP central office switches. The difference between SSP **40-42** central office switches and a non-SSP **43** central office switch is that the former includes intelligent network functionality. To provide this functionality, the switch must be equipped with the appropriate hardware and software to allow it to communicate with other AIN components. The most significant aspect of this communication is the ability for an SSP to transmit trigger messages or queries to the AIN and receive and process AIN responses. A trigger message is used to inform the AIN of an event or a state change that has occurred at an SSP. When a set of predetermined conditions are detected at an SSP, the SSP will respond by: initiating a trigger associated with the specific call processing state for the present call on a subscriber line; generating and transmitting an appropriate trigger message over the AIN; and suspending call processing for the present call until a response is received from the AIN. The AIN response will instruct the SSP to

take certain actions in processing the present call. If the SSP does not receive a response from the AIN, a default task will be executed upon the expiration of a default timer. The Non-SSP switches are electronic switches or electro-mechanical switches that can generate certain rudimentary data packets and provide them over the network; however, they require additional equipment in order to provide their subscriber lines with the more complex features and services available in the intelligent network.

The Service Control Points (SCP) **20-21**, house much of the intelligence, and the basis for many of the new enhanced features of the AIN. Among the functions performed by the SCPs are maintenance of network databases **60-61** used in providing enhanced services, screening calls, routing calls, and authorizing specific features.

The Signal Transfer Points (STP) **30-31** are utilized in linking the SCPs and SSPs. Data packets flowing between the SCPs and SSPs generally go through one or more STPs. Those skilled in the art will recognize that STPs are simply multiple port, high speed, packet switches that are programmed to respond to the routing information in the appropriate layer of the SS7 protocol, and route the packet to its intended destination.

The Service Nodes (SN) **50-51** provide resources for performing specialized services for the system and subscribers. A typical SN will have resources such as voice signal detection; DTMF signal recognition; voice synthesis devices; voice digitization; and storage capabilities. An SN is used principally when some enhanced feature or service is needed that requires an audio connection to the caller or transfer of a significant amount of data to a subscriber over a switched connection during or following a call. Services that are implemented during a call (i.e., after completion of ringing or called subscriber pick up) usually employ the facility of a SN such as SNs **50-51**. These services include voice mail, facsimile reception and storage.

The Service Management System (SMS) **10** contains the high-level intelligence of the telephone network. The SMS is implemented by a large general purpose digital computer and interfaces to business offices of the local exchange carrier and interexchange carriers. The functions of the SMS include: downloading information to SCP and SN databases when new subscribers are added or subscribers

modify their ensemble of AIN services; performing data reloads when a SCP or SN crashes or software needs to be updated; implementing high volume routing services, such as call forwarding and 800 number translation and routing; maintaining and providing access to high volume databases for the authorization of billing, such as credit card number validations; and downloading, on a non-real-time basis, billing information that is needed in order to appropriately invoice telephone company subscribers for the services provided.

AIN Interconnections

Fig. 1. illustrates the interconnections of the AIN components via data links **110-119**. Currently, these data links are 56 kilobit per second bi-directional data links employing the Signaling System 7 (SS7) protocol. The SS7 protocol is well known to those skilled in the art and is described in a specification promulgated by the American National Standards Institute (ANSI), publication ANSI T1.114, 1988.

The SSPs are interconnected by trunk circuits. Fig. 1 shows trunk circuit **140** connecting SSP central office switches **40** and **42**, and trunk circuit **141** connecting SSP central office switch **40** and non-SSP central office switch **43**. These interconnecting trunks are voice channels over which calls are connected when completed.

The SNs are connected to the central office switches that they service as shown in Fig. 1. The SNs are typically connected to one or more (but normally only a few) central office switches via Integrated Service Digital Network (ISDN) links. Fig. 1 shows an ISDN link **150** connecting SN **50** to SSP **42**. Not shown in Fig. 1, SN **50** will also have an ISDN link connecting to SSP **40** and any other central office switches that are serviced by SN **50**. Likewise, SN **51** is shown in Fig. 1 as being connected to SSP **41** with ISDN link **151**.

Termination equipment is installed at the subscriber's premises and may include telephones, facsimile machines, computer modems, security systems and other telephonic equipment. Fig. 1 shows a plurality of terminating equipment **70-70'**, **71-71'**, **72-72'**, and **73-73'**. Subscriber lines designated as **170-170'**, **171-171'**, **172-172'**, and **173-173'** are used to connect the terminating equipment to the local central office switches **40**, **41**, **42** and **43** respectively. Each of the

subscriber lines is also assigned a directory number shown as DN70-DN70'; DN71-DN71'; DN72-DN72'; and DN73-DN73' in Fig. 1.

TCAP Operation

In order to keep the processing of data and calls as simple and generic as possible at the SSP 40-43 central office switches, a relatively small set of triggers are defined for each call processing event. A trigger within the AIN is an event associated with a particular activity occurring on a particular subscriber line. In response to a trigger, the SSP generates a TCAP query which is essentially a data packet to be transmitted to a SCP. The transmitted data packet instructs the SCP to query its database and determine whether a customized calling feature or enhanced service should be provided for this particular call, or whether conventional plain dial-up telephone service should be provided. The results of the database inquiry are placed into a data packet and sent back to the SSP in the form of a TCAP response. Several queries and responses provided within the TCAP include the INVOKE query and the RETURN RESULT, RETURN RESULT LAST, RETURN ERROR, and REJECT responses.

The response provided by the SCP instructs the SSP to take special actions to provide a customized calling service or enhanced feature, or may indicate to the SSP that plain telephone service should be provided for the particular call. In response to receiving the latter type message, the switch will move through its call processing states, collect the dialed digits, and generate further packets that will be used to set up and route the call.

An example of a TCAP message exchange for an 800 toll free call attempt is shown in Fig. 2. Unlike normal area codes, the 800 area code does not correspond to a specific geographical area. When an 800 number is dialed, it must be translated into a number that identifies a physical subscriber line associated with the 800 number. Specifically, at originating equipment 70, an 800 number is dialed as indicated in process block 200. DTMF signals 300 for each of the dialed digits are transmitted over subscriber line 170 to the central office switch SSP 40 that services subscriber line 170. SSP 40 collects the dialed digits and in process block 210 detects that an 800 number has been dialed. SSP 40 then formulates a TCAP message 310 containing the number dialed, the number of the calling party, and the identification number of the local

exchange. TCAP message element **310** will take the form of a query using the INVOKE primitive. TCAP message **310** is transmitted to SCP **20** through an STP (not shown in Fig. 2) over multiple SS7 digital data lines. SCP **20** receives TCAP message **310** and responds in process block **220** by performing a query of the appropriate database. The query is based on the search key containing the dialed 800 number. If the dialed number is found in the database, SCP **20** formulates TCAP message **320** which is a response, and uses the RETURN RESULT primitive. TCAP message **320** will contain the translated number and a billing indicator. TCAP message **320** is then transmitted to SSP **40**. The transmission of TCAP message **320** ends this particular messaging sequence. SSP **40** will continue to process the 800 call request by initiating additional SS7 messaging sequences to initiate a call to the translated number.

The foregoing description is a basic overview, together with an example, of the operation of the AIN which is the basis for a significant portion of the modern public switched telephone system. As will be apparent to both those skilled in the art and the casual but interested reader of this specification, the widespread use of the AIN in the modern PSTN makes it very attractive and economical to provide AIN based services to subscribers. The present invention is one of these such services.

Prior Art Systems

As mentioned earlier, several devices and systems have been developed to offer caller identification service to call recipients. One such system is described in U.S. Patent No. 4,720,848 to *Akiyama*. *Akiyama* describes a private telephone system which provides an announcement at a terminating station to either identify the recipient or originator of a call within the private telephone system. *Akiyama* describes two separate embodiments. The first embodiment pages the intended recipient of an incoming call at a specific termination equipment. The purpose of this embodiment is to identify the recipient of an incoming call in a scenario where multiple parties share the same termination equipment. The second embodiment announces the identity of the originator of a call. All of the embodiments described in *Akiyama* are limited to use within a customized private telephone switching system. Furthermore, the embodiments are only operative for calls that

originate and terminate within the private telephone switching system. In addition to this restriction, the invention described in *Akiyama* requires the use of custom termination equipment.

In all of the *Akiyama* embodiments, the termination equipment must be capable of extracting the audio information from the incoming line and announcing the information during the silent interval between the ring signals. The announcement in *Akiyama* is made prior to answering the phone, thus, the termination equipment must also include a hands free speaker and a high gain audio amplifier to provide the announcement. For the second embodiment, the termination equipment also requires the integration of a card reader to obtain the caller identification information. In this embodiment, the calling party inserts an identification card into the termination equipment prior to placing a call. The termination equipment reads the identification card and uploads this information to the switching system during an origination. The switching system then downloads this information to the called termination equipment to be announced between ringing signals. In summary, the *Akiyama* patent describes a method to provide announcements to a calling party within the confines of a custom private telephone system and utilizing custom termination equipment.

A second type of system includes incorporating a caller identification display device into the termination equipment. This system utilizes the caller identification service provided by the telephone company to identify the originator of a call. The caller identification service provided by the telephone company includes encoding the digits corresponding with the directory number of an originating party and transmitting them to the terminating equipment during the silent interval between rings. The termination equipment can then detect and display the encoded directory number. An example of termination equipment that can perform this function is described in U.S. Patent No. 4,924,496 to *Figa et al.*

U.S. Patent No. 4,922,490 to *Blakley* describes a third type of system to provide calling party identification. In *Blakley*, the central office switch which services a called party, detects the number of the originating party, retrieves announcement information from a database for the originating party, and then transmits this information to a specially equipped terminating device prior to completing the original

call. The *Blakley* patent requires special stations that are provided with hands free speakers. When an incoming call is ringing, the name of the caller is spoken over the hands free speaker. Additionally, the *Blakley* patent places the burden of providing the caller identification on the central switching office. This is an unwelcome burden to place on the central office where it is critical to minimize any overhead processing in order to respond more reliably to call switching requirements.

A problem with the above-described systems is that they require the use of customized termination equipment. Thus, in order to have the benefits of the caller identification service, the subscriber must purchase additional termination equipment. In some instances this can be quite costly. For example, a typical business may have thousands of dollars invested in its local PBX and its associated termination equipment and be unwilling to incur the cost of replacement equipment.

One system presently in operation which can provide a calling party identification service independently to the termination equipment is the Personal Number Service (PNS). PNS is described in commonly owned U.S. Application Serial No. 07/936,384. In the PNS, each subscriber is assigned a personal number which is serviced by a service node. The personal number is called by an originating party who wants to contact the subscriber. When the service node receives the call, the service node may redirect the call to the appropriate number at which to contact the subscriber. At this point, the service node can perform a network-based service such as Audio Calling Name announcement independently to the type of termination equipment.

A problem with the solution provided within the PNS system is the requirement of a personal number and a dedicated directory number for each subscriber. Because of the increased use of mobile telephones, second lines being installed in person's homes, and the ever increasing density of population in metropolitan areas, telephone numbers within certain area codes can be a scarce commodity.

In view of the foregoing, there is a need for providing a calling party identification that is independent of, and compatible with, currently available termination equipment. This would include having a system that would allow a subscriber to receive an identification of the calling party, regardless of the terminating device that the subscriber is using to answer the call. It is also apparent that this type of system

would need to utilize a mechanism common to all termination equipment in providing this identification. Clearly, the most usable mechanism would be the handset speaker. Thus, it is apparent that there is a need for a calling party identification system that will provide an audio announcement to identify the calling party.

It is also apparent that there is a need for providing a calling party identification system that can be easily accessible and available to a wide range of users. Finally, it is apparent that there is a need to provide a network based audio caller identification system that will not degrade performance on the telephone network, especially in regards to the telephone switching equipment.

There is also a need to provide a network-based service in response to receiving an incoming call, which makes efficient use of the telephone numbers. This efficiency can be achieved by not requiring multiple numbers in providing the service.

Summary of the Invention

Generally stated, this invention provides a system and a method to access enhanced calling features as a network-based service. The invention operates by utilizing network elements within the Advanced Intelligent Network (AIN). Hence, the invention can be entirely implemented within existing elements of the AIN.

Advantageously, the preferred embodiment requires the use of only one dedicated subscriber directory number in order to provide the network-based services. Thus, the inefficient use of multiple dedicated directory numbers in the provision of enhanced phone features may be alleviated. In addition, as a network-based solution, this invention allows access to enhanced telephone features without requiring subscribers to purchase or modify their existing terminating equipment.

Specifically, the preferred embodiment of this invention includes a method for providing an AIN, network-based service with respect to a call between two parties. The originating party utilizes originating equipment with an assigned directory number. The called party or service subscriber utilizes subscriber terminating equipment with an assigned directory number. When a call to the assigned directory number of a service subscriber is detected by the AIN, the processing of the call is suspended pending the performance of the network-based service. In providing the service, a network element

(typically a service node) within the AIN originates a second call to the subscribing party at the same assigned directory number as the previously detected call. The AIN detects the initiation of the second call and determines that it has been initiated in order to provide the network-based service. The SN then establishes a voice channel for the second call. When the second call is answered, the network-based service is provided by the network element that originated the second call. The second call is then transferred to the service switching point that is servicing the first call. The AIN then continues processing of the call by connecting the originating and terminating equipment.

In one embodiment of this invention, the AIN preferably operates to differentiate between the first and second calls by examining the charging directory number associated with the call. If the charging directory number does not identify the network element that would provide the service (i.e., originating service node), then the call is identified as a subscriber call, (i.e. call to the subscribing party). On the other hand, if the charging directory number identifies the network element and a subscriber call has previously been received, then the call is identified as a service call intended for providing the network-based service.

The network-based service may include delivering an audio announcement to the subscribing party. In this embodiment, an announcement message may be retrieved from a database and transmitted to the subscriber's terminating equipment. The announcement message can be retrieved based on the directory number of the originating party; however, other methods could likewise be utilized. Furthermore, the announcement message can include the identity of the calling party, the name of the intended recipient of the call or a message indicating the type or class of call that has been received (i.e., priority, urgent, long-distance).

Upon performing the network-based service, the party answering the call may be required to provide a response indicating whether the call is to be accepted or rejected. In this embodiment, the original subscriber call is only completed upon an acceptance response.

On a system level, the network components within the AIN cooperative to provide the network-based service. In the preferred embodiment, the required AIN network elements include a service node,

a service control point and a service switching point. Initially, the service switching point receives a call directed to the subscriber's directory number. The service switching point responds by: establishing a voice channel between itself and the originating device; notifying the service control point concerning the reception of the call; and suspending further processing of the call until the service control point responds.

Upon receiving the notification, the service control point provides instructions to the service switching point. In the preferred embodiment, the instructions will include a request for the service switching point to forward the call to the service node in order for the network service to be provided.

In response to these instructions, the service switching point forwards the call to the service node. The service node responds by querying a database to determine which services have been subscribed to by the subscriber. If the subscriber information includes the network-based service, the service node initiates a second call to the subscriber on the same directory number.

Upon detecting the second call, the service switching point notifies the service control point and suspends further processing of the second call until the service control point responds. The service control point responds to the notification of the second call by authorizing the service switching point to set up a voice channel between the service node and the subscriber's termination equipment. Once the voice channel is established, the service node detects the call being answered and delivers the network-based service.

Finally, the service node transfers the first call back to the service switching point where the voice channel for the second call is torn down and a voice channel between the originating equipment and the subscriber's equipment is established.

In the preferred embodiment, the network-based service can be implemented by use of two network elements: a service control point and a service node. Those skilled in the art will understand that other network elements may be used instead of or in addition to the service control point and service switching point so long as these other network elements are configured to provide the necessary functions for implementation of the method and system of the present invention.

In the preferred embodiment, the service control point operates to receive and determine the type of call setup request that has been received. If the setup request is for a subscriber call between an originating party with originating equipment and a subscribing party with subscribing equipment, the service control point preferably forwards the call to the service node servicing the subscribing equipment. If the setup request is for a service call in response to a previously forwarded subscriber call, the service control point preferably operates to authorize the service call to be established or completed.

In one embodiment, the service control point determines the type of call setup request by identifying the originating source of the call. If the call is originated by the subscribing equipment's service node subsequent to the service control point forwarding a subscriber call to the service node, then the call setup request is for a service call. But if the originating source of the call is not the subscribing equipment's service node, then the call setup request is for a subscriber call.

In another embodiment, the originating source of the call is determined by examining a charge number parameter within the call setup request. The charge number parameter indicates the directory number that the call should be billed to. In this embodiment, if the charge number of a call setup request includes the directory number of the subscribing equipment's service node, then the setup request is for a service call. Otherwise, the setup request is for a subscriber call.

In the preferred embodiment, the service node operates to receive a forwarding request for a call to a subscribing directory number and then determines whether a network-based service is required for the call. If a service is required, the service node initiates a service call to the same subscribing directory number. Once the call is answered, the service node provides the network-based service and then transfers the call to a service switching point for further processing.

In one embodiment, the service node determines that a network-based service is required for the call by querying a database for subscription information associated with the called subscribing directory number. Upon retrieving the subscription information, the service node can determine which services the subscribing directory number requires.

In another embodiment, the network-based service includes delivering an announcement message to the terminating equipment. One method to provide this service is to query a database based on the directory number associated with the originating equipment, retrieving a message and then transmitting that message to the terminating equipment over the service call.

It is therefore an object of the present invention to provide a network-based service, utilizing Advanced Intelligent Network components within the infrastructure of the public switched telephone network.

It is also an object of the present invention to provide a network-based service in response to receiving an incoming call, without requiring the use of multiple dedicated subscriber numbers.

It is also an object of the present invention to provide a calling party identification that is independent of, and compatible with, currently available termination equipment.

It also is an object of the present invention to provide an audio caller identification feature that is independent of, and will be compatible with, currently available termination equipment.

That the present invention accomplishes these objects will be appreciated from the detailed description of the preferred embodiment to follow.

Brief Description of the Drawings

Fig. 1 is a simplified diagram of the AIN as it currently exists in the public switched telephone network.

Fig. 2 is a timing diagram of an 800 call number translation utilizing the Transaction Capabilities Application Part of the AIN.

Fig. 3 is a flow chart illustrating the steps performed by the preferred embodiment of the present invention.

Fig. 4 is a timing diagram illustrating the preferred embodiment of the present invention.

Detailed Description of the Preferred Embodiment

The present invention provides a system and a method to deliver network-based, call enhancement features to a subscriber without requiring a modification or replacement of the subscriber's existing termination equipment. In this system, performance advantages over the

prior art are gained based on the ability to provide network-based call enhancement features or services: (1) through the use of the public switched telephone network, so as to have a wide distribution of the service; (2) without requiring additional dedicated directory numbers to be allocated for each subscriber; and (3) without requiring the subscribers to modify existing termination equipment or purchase additional equipment.

Although the preferred embodiment will be described as operating within the public switched telephone network and utilizing Advanced Intelligent Network components, those skilled in the art will recognize that the present invention also can be implemented within a private telephone network or utilizing alternate components within the public switched telephone network. Additionally, the preferred embodiment will be described as providing an audio caller identification service or Audio Calling Name. Those skilled in the art will recognize that the Audio Calling Name service is just one of many services which can be provided with the present invention. The present invention also can be used to implement other call enhancement features such as call forwarding, general announcement services, called party identification, etc.

Referring now to the drawings in which like numerals represent like elements throughout the several figures, the preferred embodiment of the present invention will be described. Fig. 3 is used to illustrate the general process flow in providing the preferred embodiment. Following this description, a specific example in conjunction with Fig. 1 and Fig. 4 is used to illustrate the specific interaction between AIN components in implementing the preferred embodiment.

Turning again to Fig. 1, a simplified diagram of the AIN as it currently exists in the public switched telephone network is provided. The present invention can be shown as operating between originating equipment and termination equipment that do not share a common SSP. SSP **40** services termination equipment **70** and has been labeled respectively in Fig. 1 as the originating SSP and originating equipment. SSP **42** services termination equipment **72** and has been labeled respectively in Fig. 1 as the terminating SSP and subscribing termination equipment. Again, as discussed previously, Fig. 1 is a simplification of a

current AIN implementation of the PSTN as it exists today. The purpose of Fig. 1 and the following example is to diagram the minimum number of elements required to accurately describe the invention and its simplicity should not be construed to limit the scope of this invention in any manner.

As an example, an originating party utilizing originating equipment **70** attached to subscriber line **170** and identified by directory number **DN70** places a call to an Audio Calling Name subscriber. The subscriber having termination equipment **72** connected to subscriber line **172** is identified by directory number **DN72**. The originating subscriber line **170** is serviced by SSP **40** and the Audio Calling Name subscriber line **172** is serviced by SSP **42**. SSP **42** is connected to SN **50** via ISDN link **150**. SN **50** serves the Audio Calling Name subscriber and has a directory number identified as **DNSN50**. SSP **40** and SSP **42** are interconnected by trunk circuit **140** and are both connected to STP **30** via data links **117** and **116** respectively. STP **30** is connected to SCP **20** via data link **114** and SCP **20** is connected to SMS **10** via data link **111**. SMS **10**, SCP **20** and SN **50** have access to databases **64**, **60** and **62** respectively.

Prior to receiving the call, the subscriber had to become an Audio Calling Name subscriber. At that time, SMS **10** was modified to indicate that the additional service was to be provided to the subscribing directory number. In a manner well known to those skilled in the art, this information was then downloaded to SCP **20** via data link **111** and SN **50** via data link **110** and the information was stored in their respective databases **60** and **62**.

Now turning to Fig. 3, the processes required in providing the preferred embodiment of the present invention is illustrated. Fig. 3 illustrates the actions taken by SCP **20** (shown in the left column) and SN **50** (shown in the right column) in implementing this embodiment. The entire process requires several related and dependent steps to occur at both SCP **20** and SN **50**. Thus, processing is shown at one network element until a point is reached where further processing is stopped pending processing at another network element. In Fig. 3, this is indicated by placing a solid dot at the last process block executed and an arrow indicating a transition of processing flow to the other network element.

Process block **252** shows the reception of a first call attempt to a terminating device associated with a subscribing directory number. Generally, in response to the call attempt, the SCP **20** receives a query. More specifically, when an originating party dials the directory number of a subscriber, the SCP **20** typically is notified of a call request by a service switching point servicing the called directory number. This occurs after the service switching point detects the incoming call and initiates a terminate attempt trigger message to the SCP.

When SCP **20** receives a termination attempt message, a determination is made concerning the origination and purpose of the call request. In this particular example, the purpose of this first call request is to set up a subscriber call between the service subscriber's termination equipment and the originating party's originating equipment. SCP **20** makes this determination by examining various fields in the termination attempt message such as the originating party's directory number and the charge number parameter. For this first call request, SCP **20** forwards the call to a SN **50** associated with the called subscriber as indicated by process block **254**.

Process block **256** shows the reception of the forwarded call by SN **50**. The forwarded call contains information identifying the originating source and destination of the call by their respective directory numbers. SN **50** responds to the forwarded call by performing a database query in process block **258**. The database query is performed to identify the services that the called subscriber is entitled to receive and also, to obtain any information necessary in providing these services. For an embodiment providing an Audio Calling Name service, the query may retrieve an audio announcement message based on the directory number associated with the originating equipment.

SN **50** then originates a second call to the subscriber at the directory number identified in the forward call request. This step is illustrated in process block **260**. The second call is a service call which is intended for providing the network-based service to the subscriber. The second call results in the reception of a second call request being received by the SCP **20** as shown in process block **262**. Again, the call request takes the form of a termination attempt trigger message. In this case, SCP **20** determines that the originator of the second call is SN **50** and that the purpose of the call is to provide a network-based service to a

subscriber. Therefore, SCP **20** authorizes the network to set up a voice channel for the second call request in process block **264**.

As a result of authorizing the network to set up a voice channel, one is established between SN **50** and the subscriber's termination equipment associated with the dialed directory number. In addition, the termination equipment provides a ring indicator to the subscriber. If the subscriber answers the call, an off-hook indication is sent to SN **50**. SN **50** detects the off-hook condition as shown in process block **266**. In response to the off-hook detection, SN **50** performs the subscribed service over the voice channel as illustrated in process block **268**. For an embodiment providing an Audio Calling Name service, SN **50** transmits an audio announcement message to the subscriber's termination equipment. This message indicates to the subscriber that a call from the identified originating party has been received and the subscriber can either accept or reject the call. SN **50** then waits for a response from the user concerning the acceptance or rejection of the call. In the case where the subscriber accepts the call, the SN **50** responds by transferring the original forwarded call back to the telephone network in process block **270** so that a voice channel can be set up between the originating party and the subscriber. In the case where the subscriber does not accept the call, the service call and the original subscriber call are torn down and no further processing takes place.

In summary, Fig. 3 illustrates the processing steps required by a service control point and a service node in implementing the preferred embodiment. The two elements operate to detect a call for a subscriber and establish a service call between the service node and the subscriber over which a network-based service is provided. In addition, the elements operate to complete the call between the subscriber's termination equipment and the originating equipment.

Fig. 4 illustrates the details of the interaction between the AIN components used in providing the preferred embodiment of the present invention. This embodiment includes providing an announcement service over the network. When the originating party utilizing originating equipment **70**, picks up the handset and dials directory number **DN72** assigned to a subscriber having terminating equipment **72**, DTMF or digital signals, (depending on the configuration of the originating equipment) are sent into the network from the

originating equipment 70 in process block 251. These signals ultimately result in the reception of a data packet at SSP 42 which services subscriber line 172 attached to terminating equipment 72. The data packet received at SSP 42 indicates that a call attempt to the subscriber is being requested. In response to receiving the data packet, SSP 42 then generates a termination attempt trigger (TAT). The TAT results in SSP 42 transmitting termination attempt message 350 to STP 30 over data link 116 and then suspending the call processing of the subscriber call request until a response is received from SCP 20.

STP 30 responds to the reception of the termination attempt message 350 by formatting the received data into a TCAP query message 352 and routing it to SCP 20 over data link 114. The TCAP query message 352 received by SCP 20 contains several parameters and comprises a call setup request to the subscriber. Included among the parameters in TCAP query message 352 preferably is the directory number for the originating party DN70, the directory number for the subscriber DN72, and a charge number directory number. The charge number parameter indicates the identity of the party that should be billed for the current call. For the present example, the charge number parameter is set to the value of the originating party's directory number DN70.

In process block 252, the reception of the call request by SCP 20 is shown. SCP 20 responds by examining the parameters in TCAP query message 352 to determine the necessary action required. In making this determination, SCP 20 queries its database 60 shown in Fig. 1 to determine what services need to be performed for the directory number DN72. If the directory number belongs to a subscriber of the announcement message service, then SCP 20 must determine the purpose of the call request. The purpose of a received call request is determined at SCP 20 by following a simple algorithm. First, SCP 20 queries its database to determine the directory number of the SN servicing the subscriber. In this case, the directory number for SN 50, DNSN50 will be retrieved. Second, the charge number parameter of TCAP message 352 is examined to determine if it is equal to DNSN50, the directory number for SN 50. The charge number parameter in this case is equal to the originating party's directory number DN70 and not the directory number for SN 50; therefore, SCP 20 concludes that the call request is

for a subscriber call between two parties. In AIN call processing, SCP **20** would next transmit an authorize termination message to setup a voice channel for the requested call; however, because the called directory number **DN72** belongs to an announcement message service subscriber, SCP **20** transmits a "forward call to SN" TCAP response message, as shown in process block **254**, to SSP **42**. Similar to termination attempt message **350**, the TCAP response message propagates through STP **30**.

The TCAP response message **350** received by SSP **42** contains the directory number for the originating party and the subscriber. In addition, the TCAP response directs SSP **42** to forward the call to SN **50**. Upon reception of the TCAP response message, SSP **42** formulates an ISUP message **354** to be transmitted to SN **50**. The ISUP message **354** also contains the directory numbers for the originating party **DN70** and the subscriber **DN72**. Finally, SSP **42** maintains the suspended state of processing the present call.

In process block **258**, SN **50** performs a query of database **62** shown in Fig. 1, using the directory number of the originating party **DN70** as a search key. The purpose of this query is to retrieve the necessary data for SN **50** to generate the announcement message. The data retrieved can take on several forms, including digitized voice or an analog recording, and the method employed for generating the announcement message should in no way limit the scope of the present invention. In addition, if there are no entries in database **62** for the originating directory number **DN70**, SN **50** may generate a customized announcement message.

Next, SN **50** will attempt to originate a call to the subscriber at the directory number **DN72** provided in the forward call information. This call is a service call originated to establish a voice channel between SN **50** and the subscriber's termination equipment. Upon establishing the voice channel, the announcement message can be delivered. The process employed in this step is unique in that SN **50** takes advantage of the fact that call processing of the original call to the subscriber has been suspended by SSP **42**, and hence a call to the subscriber utilizing the same directory number can be initiated. This allows for the provision of a service in an efficient manner because additional directory numbers are not required. In other solutions that

attempt to provide similar services as those of the present invention, a directory number for the subscriber and a second dedicated directory number are required. Thus, in other solutions, each subscriber to the service requires two dedicated directory numbers. Because directory numbers in a given area code are a limited commodity, the present invention advantageously is implemented in a manner that is directory number efficient.

SSP **42** will respond to the reception of this service call in a manner similar to the first call to the subscriber at the given directory number **DN72**. Thus, a termination attempt trigger will be issued and termination attempt message **356** will be transmitted to STP **30** over data link **116**. In addition, the processing of the second call request will be suspended until a response is received from SCP **20**.

STP **30** responds to the reception of the termination attempt message **356** by formatting the received data into a TCAP query message **358** and transmitting it to SCP **20** over data link **114**. The TCAP query message **358** received by SCP **20** contains several parameters and comprises a call setup request to the subscriber. Included among the parameters in TCAP query message **358** preferably is the directory number for SN **50** as the originating party parameter, the directory number for the subscriber **DN72**, and a charge number parameter. For the service call initiated by SN **50** in response to the forwarded subscriber call, the charge number parameter is set to the directory number **DNSN50**.

In process block **262**, the reception of the second call request by SCP **20** is shown. SCP **20** again responds by examining the parameters in TCAP query message **358** to determine the necessary action required. SCP **20** queries its database **60** shown in Fig. 1 to determine what services need to be performed for the directory number **DN72**, assigned to the subscriber. If the directory number **DN72** belongs to a subscriber of the service to be provided, then SCP **20** proceeds to determine the purpose of the present call request. Following the algorithm described above, SCP **20** queries its database to determine the directory number of the SN servicing the subscriber. Once again, the directory number of **DNSN50** will be retrieved for SN **50**. Next, the charge number parameter of TCAP message **358** is examined to determine if it is equal to the directory number **DNSN50**. Determining

the charge number parameter is equal to directory number DNSN50, SCP 20 concludes that the call request is for service call.

In addition, SCP 20 verifies that a service call request is expected by determining if a "forward call to SN" response message had previously been sent out in response to a first call request. This can be accomplished in various methods. One method would be to maintain a status flag at SCP 20. The status flag would operate by having a first defined state when a pending subscriber call has been received and forwarded to a SN. In this state, the reception of a service call would be expected. The status flag would have a second defined state when there are no pending subscriber calls. In this second state, the reception of a service call is unexpected.

Upon verifying that the SCP is expecting a service call, SCP 20 authorizes the termination as shown in process block 264. The authorization operates to instruct SSP 42 to set up a voice channel for the requested call. In this case, SSP 42 will establish a voice channel between SN 50 and the subscriber's termination equipment and then provide a ring indication to the subscriber.

When the subscriber responds to the call by lifting the handset of the termination equipment 72, an off-hook indication is detected by SSP 42 which is then communicated to SN 50. SN 50 responds to the off-hook condition by performing the network-based service. In the embodiment being described, SN 50 would transmit an announcement message over the voice channel comprised of ISDN link 150, SSP 42 and subscriber line 172, as shown in process block 260.

In another embodiment, the subscriber may be required to respond to the provision of the network-based service. For example, an announcement message may be delivered to the subscriber which identifies the originating source of the call. Upon receiving the announcement message, the subscriber may respond by accepting or rejecting the call. Various methods can be utilized to accomplish this task. The subscriber could provide an acceptance indication by pressing a specific key to deliver a DTMF signal to SN 50, transmit a flash signal, provide an audible acceptance, remain off-hook for a required time period or utilize some other method. The subscriber could provide a rejection indication by pressing a specific key to deliver a DTMF signal

to SN 50, placing the handset of the termination equipment on-hook, deliver an audible rejection or utilize some other method.

When the subscriber responds by accepting the call and the response is received by SN 50, SN 50 transfers the call previously forwarded to it in process block 254 and ISUP message 354, back to SSP 42.

SSP 42 responds to the call transfer by establishing a voice channel between the called subscriber and the originating party. In the particular example being illustrated, this voice channel consists of subscriber line 170 and trunk circuit 140 being bridged by SSP 40 and subscriber line 172 being bridged by SSP 42.

From the foregoing description, it will be appreciated that the present invention provides a system and a method to efficiently implement network-based call enhancement services. The present invention can be implemented in a manner to minimize the use of additional directory numbers. This is advantageous since directory numbers are generally a limited commodity within an area code and can be very limited in highly populated areas. Because the present invention exploits the use of directory numbers that are already in operation rather than requiring the use of additional directory numbers, minimal impact on the availability of directory numbers is incurred by this invention.

The present invention also provides a system and a method to implement network-based call enhancement services without impacting the subscriber's termination equipment. The present invention has been described as a network-based solution which can operate completely within network elements. Therefore, this invention will allow subscribers to access enhanced calling features without requiring them to purchase or modify their existing terminating equipment.

The present invention has been described in relation to particular embodiments which are intended in all respects to be illustrative rather than restrictive. Those skilled in the art will understand that the principles of the present invention may be applied to, and embodied in, various types of telecommunication equipment and systems. Those skilled in the art will also understand that the present invention may be utilized to provide a variety of network-based services only some of which have been identified herein.

Alternate embodiments will become apparent to those skilled in the art to which the present invention pertains without departing from its spirit and scope. Therefore the scope of the present invention is to be limited only by the claims below and equivalents thereof.

CLAIMS

What is claimed is:

1. A telecommunications system for providing a network-based service with respect to a call between an originating device associated with an originating directory number and a terminating device associated with a subscribing directory number, comprising:

a service node;

a service control point; and

a service switching point;

said service switching point being operative:

a. to receive a call setup message for said subscribing directory number,

b. to establish a first voice channel between said originating device and said service switching point,

c. to transmit to said service control point a request to set up a call for said call setup message, and

d. to suspend the processing of said call pending the receipt of instructions with respect to the further processing of said call;

said service control point being operative:

e. to receive said request to set up said call, and

f. to transmit to said service switching point said instructions;

said service switching point being further operative:

g. to receive said instructions, and

h. to forward said call to said service node in response to receiving said instructions;

said service node being operative:

i. to receive said forwarded call,

j. to query a database for subscriber information associated with said subscribing directory number, and

k. in response to finding said subscriber information, to initiate a service call to said subscribing directory number;

said service switching point being further operative:

l. to receive said service call for said subscribing directory number,

m. to transmit to said service control point a request to setup said service call, and

n. to suspend the processing of said service call pending the receipt of service call instructions with respect to the further processing of said service call;

said service control point being further operative:

o. to receive said request to set up said service call, and

p. to transmit to said service switching point, said service call instructions;

said service switching point being further operative:

q. to receive said service call instructions, and

r. to establish a call path comprising a second voice channel between said terminating device and said service switching point and a third voice channel between said service node and said service switching point;

said service node being further operative:

s. to provide said network-based service over said call path, and

t. to transfer said service call to said service switching point;

said service switching point being further operative:

u. to receive said service call transferred from said service node,

v. to close said third voice channel, and

w. to establish a bridged voice channel comprising said first voice channel and said second voice channel.

2. The system of Claim 1, wherein said network-based service comprises an announcement service and said service node is further operative to provide said network-based service by:

a. retrieving an announcement associated with said originating directory number from said database; and

b. delivering said announcement to said terminating device over said call path.

3. The system of Claim 1, wherein said network-based service comprises a caller identification announcement service and wherein said service node is further operative to provide said network-based service by:

a. retrieving a caller identification announcement associated with said originating directory number from said database; and

b. delivering said caller identification announcement to said terminating device over said call path.

4. In an advanced intelligent telecommunications network including a service node, a method for providing a network-based service with respect to a subscriber call between an originator having originating equipment associated with an originating directory number and a subscriber having terminating equipment associated with a subscribing directory number, comprising the steps of:

a. receiving a first call setup request at a service control point;

b. identifying that said first call setup request pertains to a subscriber call between said originating equipment and said terminating equipment;

c. in response to said first call setup request, causing said subscriber call to be forwarded to said service node;

d. receiving a second call setup request at said service control point;

e. in response to receiving said second call setup request, identifying that said second call setup request pertains to a service call initiated by said service node in response to receiving said subscriber call by said service node; and

f. authorizing the establishment of said service call for providing said network-based service.

5. The method of Claim 4, wherein said step of identifying said first call setup request further comprises the steps of:

a. examining said first call setup request;

b. identifying said first call setup request as said subscriber call if the originator of said first call setup request is not said service node; and

c. setting an indicator identifying that said subscriber call has been received.

6. The method of Claim 5, wherein said step of identifying said second call setup request further comprises:

a. examining said second call setup request; and

b. identifying said second call setup request as said service call if said indicator identifies that said subscriber call has been received and if said originator of said second call setup request is said service node.

7. The method of Claim 4, wherein said service node has a service node directory number and said step of causing said subscriber call to be forwarded further comprises the steps of:

a. modifying a charge number parameter of a forward call message to include said service node directory number; and

b. transmitting said forward call message to a service switching point servicing said service node.

8. The method of Claim 7, wherein said step of identifying said second call setup request further comprises determining that said charge number parameter for said second call setup request includes said service node directory number.

9. In an advanced intelligent telecommunications network, a method for providing a network-based service with respect to a subscriber call between a caller having originating equipment associated with an originating directory number and a subscriber having terminating equipment associated with a subscribing directory number, comprising the steps of:

a. receiving a call forwarding request at a first network element, said call forwarding request being associated with a subscriber call between said originating equipment and said terminating equipment and said subscriber call being directed to said subscribing directory number;

b. determining that said call forwarding request invokes the provision of said network-based service by said first network element;

c. causing said first network element to initiate a service call to said terminating equipment associated with said subscribing directory number; and

d. in response to said service call being established, causing said network-based service to be provided by said first network element.

10. The method of Claim 9, wherein said first network element has a database and wherein said determining step further comprises the steps of:

a. retrieving subscription information associated with said subscribing directory number from said database; and

b. determining that said subscription information requires said network-based service to be invoked for calls to said subscribing directory number.

11. The method of Claim 9, wherein said network-based service comprises an announcement message service and said step of providing said network-based service further comprises the steps of:

a. retrieving an announcement message associated with said originating directory number from a database; and

b. causing said announcement message to be transmitted to said terminating equipment.

12. In an Advanced Intelligent Network (AIN) comprising at least one AIN element, a method for providing a network-based service with respect to a subscriber call between a caller having originating equipment associated with an originating directory number and a subscriber having terminating equipment associated with a subscribing directory number, comprising the steps of:

a. detecting a subscriber call for said subscribing directory number;

b. suspending the call setup processing of said subscriber call;

c. causing said AIN element to originate a service call to said subscribing directory number;

d. detecting said service call for said subscribing directory number;

e. upon establishing said service call, said AIN element providing said network-based service over said service call to said terminating equipment;

f. after providing said network-based service, receiving disposition information from said terminating equipment; and

g. continuing said call setup processing of said subscriber call in accordance with said disposition information.

13. The method of Claim 12, wherein said step of detecting said subscriber call further comprises the steps of:

a. receiving a first call for said subscribing directory number;

b. identifying said first call as said subscriber call if the originator of said first call is not said AIN element; and

c. setting an indicator identifying that said subscriber call has been received.

14. The method of Claim 13, wherein said step of detecting said service call further comprises the steps of:

a. receiving a second call for said subscribing directory number; and

b. identifying said second call as said service call if said indicator identifies that said subscriber call has been received and if said originator of said second call is said AIN element.

15. The method of Claim 12, wherein said advanced intelligent network includes a database of announcements for a plurality of originating directory numbers and wherein said network-based service comprises an announcement service, and

wherein said providing step further comprises the steps of:

a. retrieving an announcement from said database in accordance with said originating directory number; and

b. transmitting said announcement to said terminating equipment over said service call.

16. The method of Claim 12, wherein said disposition information comprises an acceptance of said call and wherein said continuing step further comprises the steps of:

a. closing said service call; and

b. establishing said call between said terminating equipment and said originating equipment.

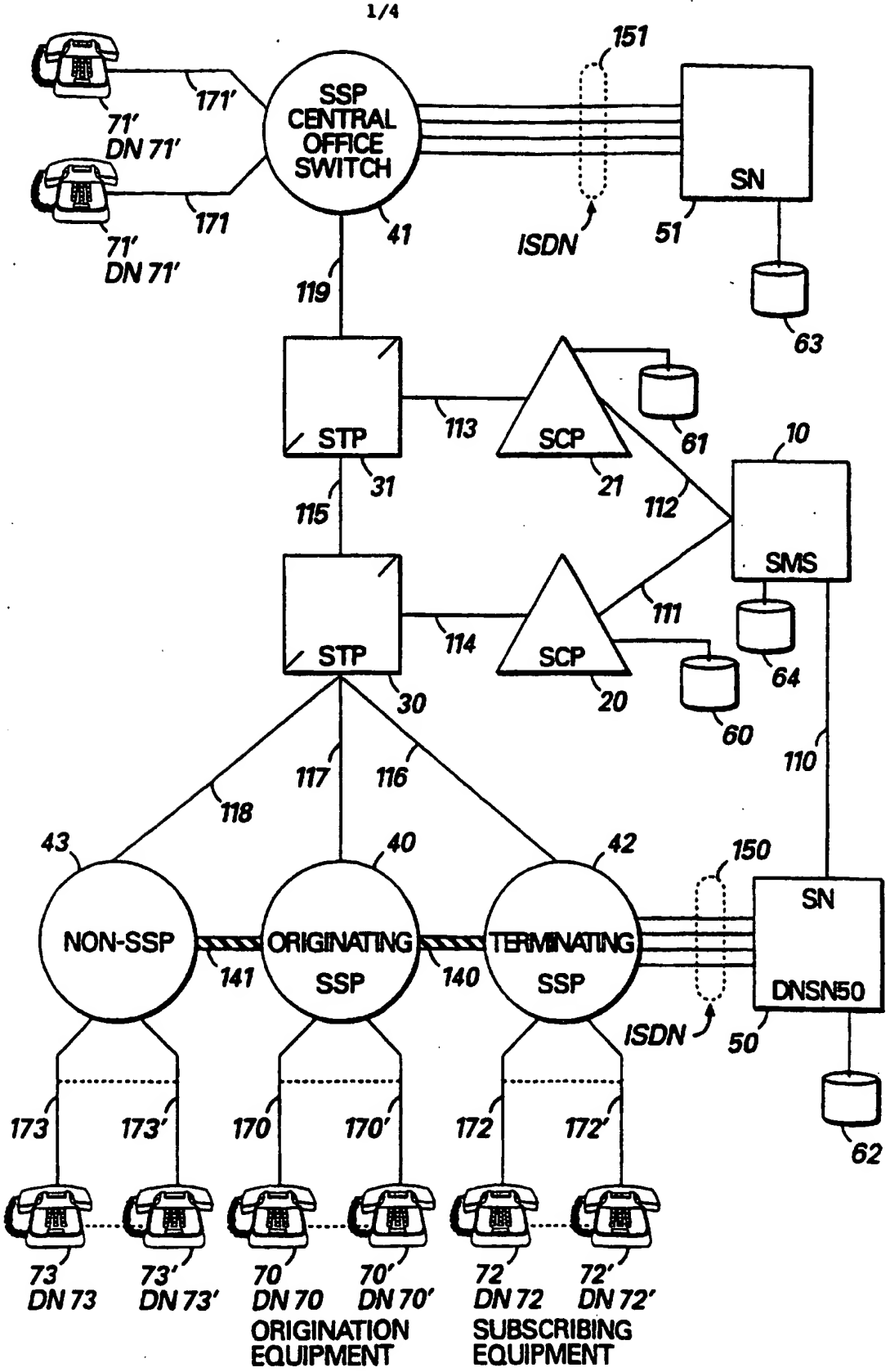

FIG.1

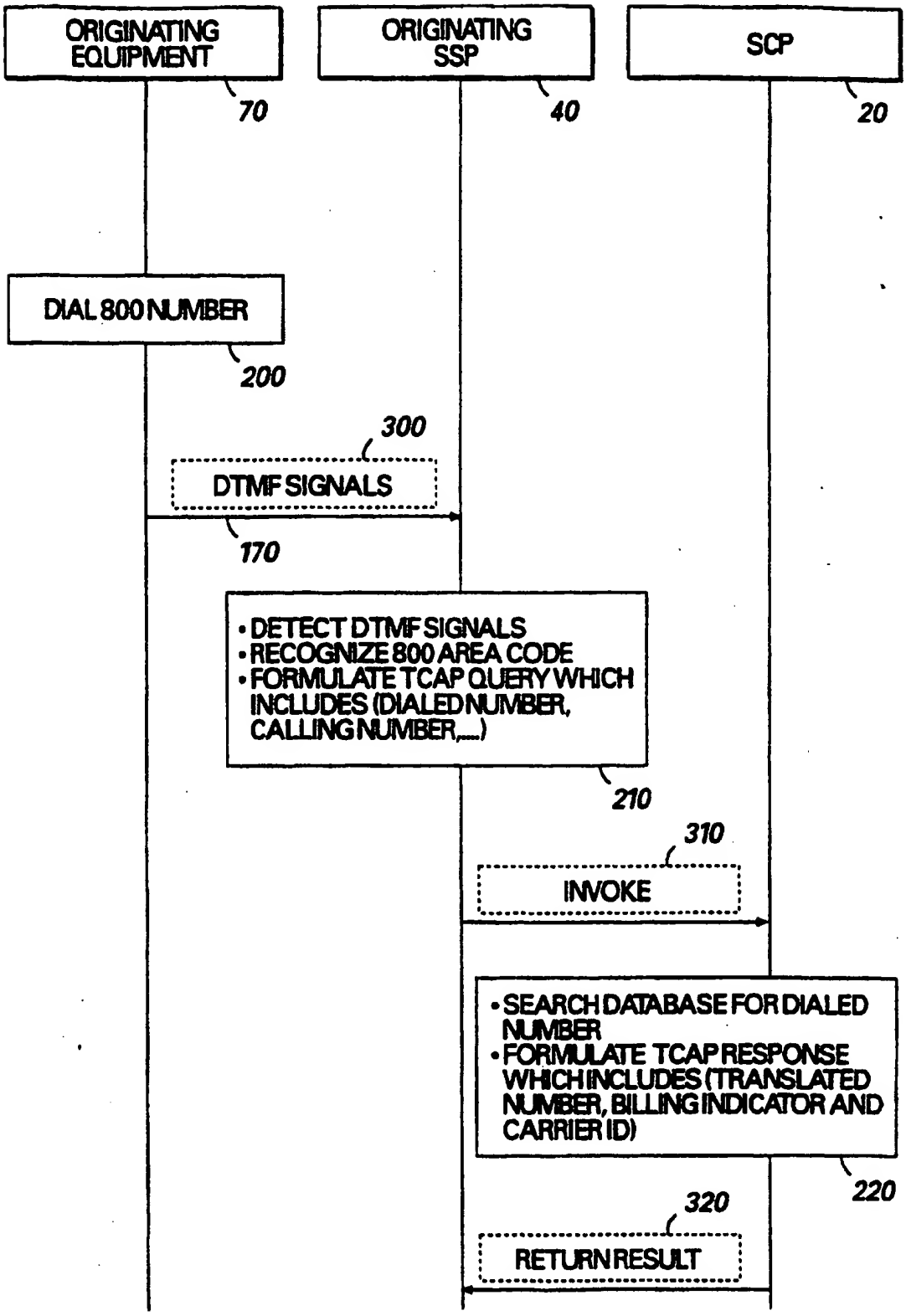

FIG.2

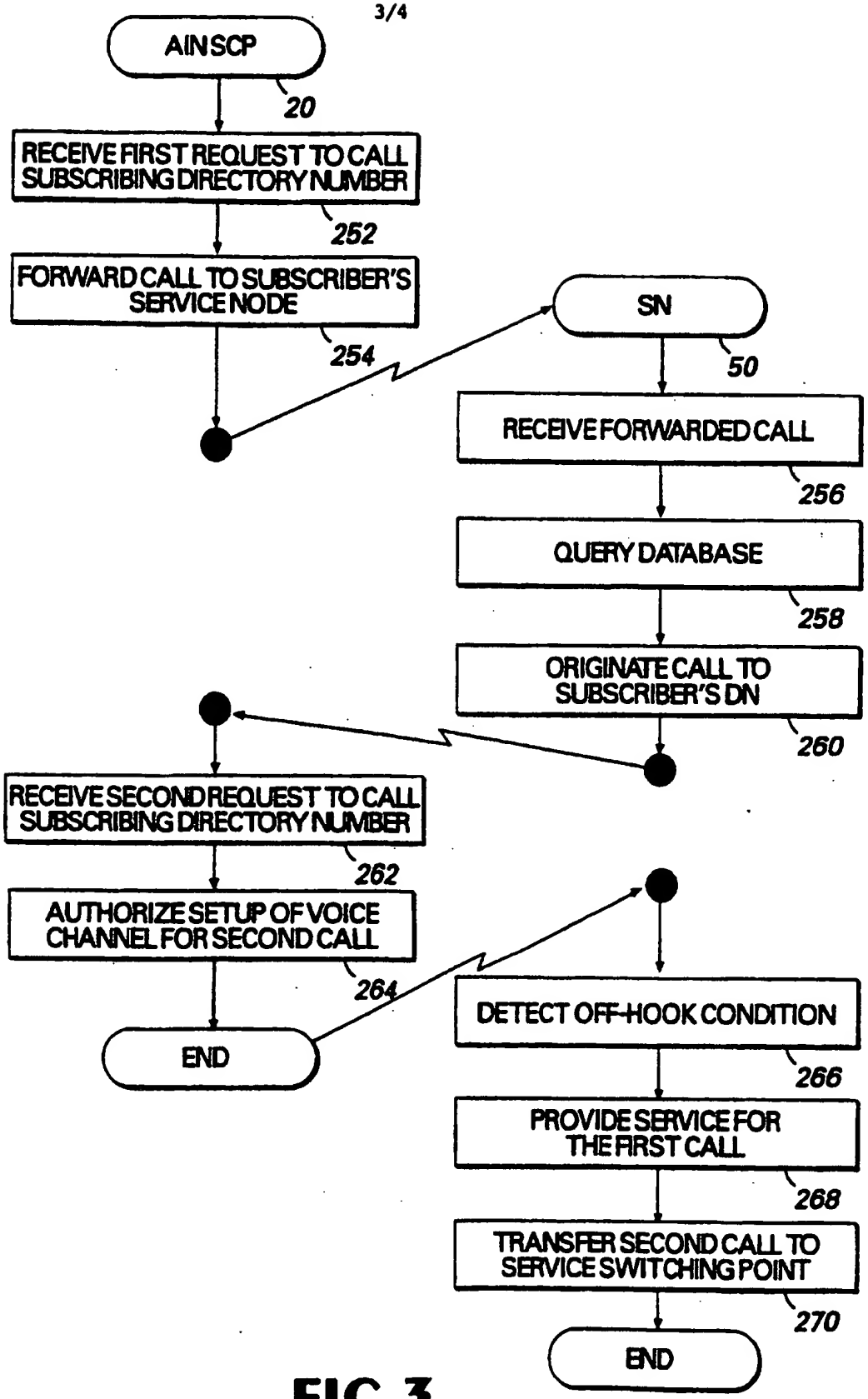

FIG.3

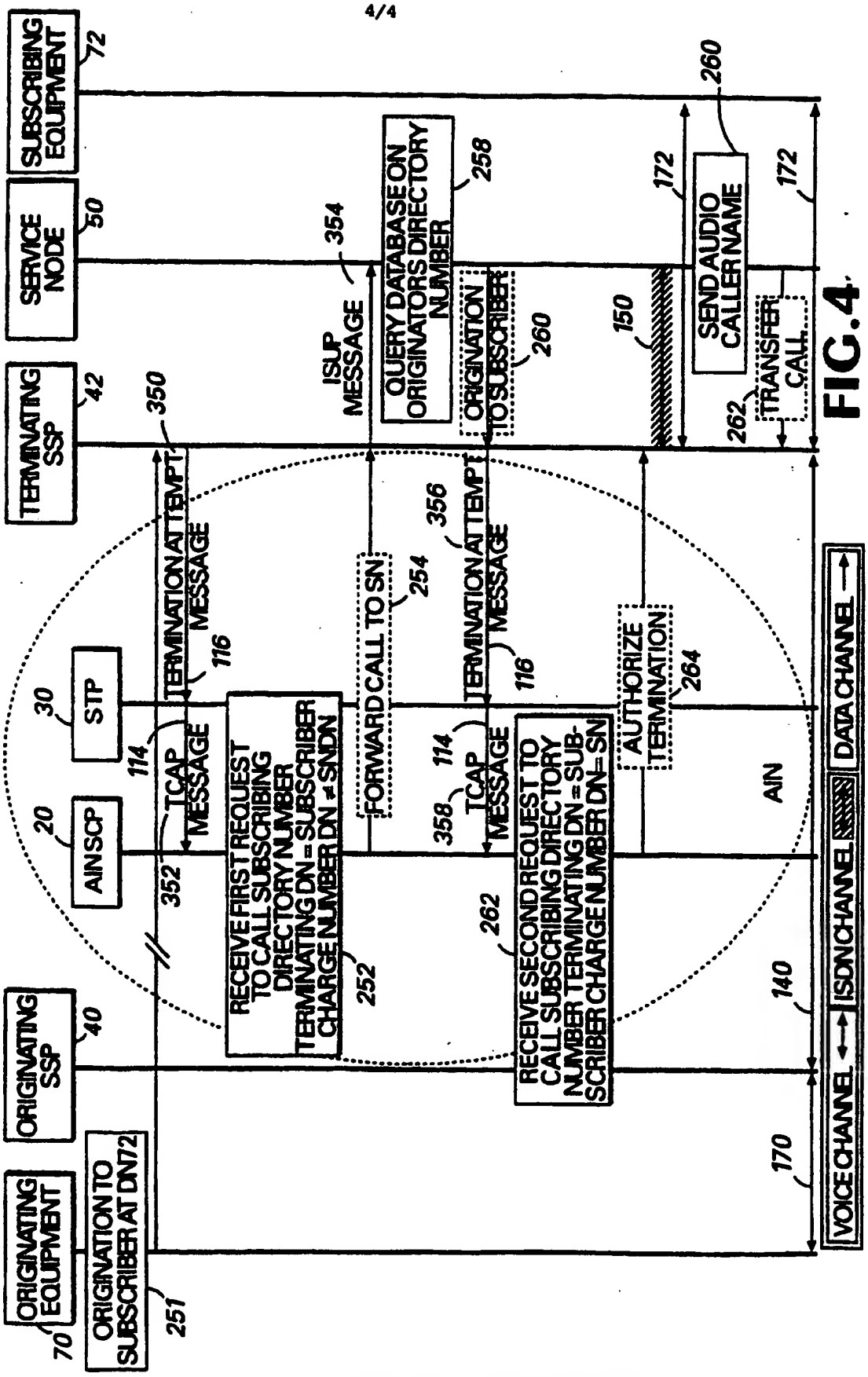

FIG.4

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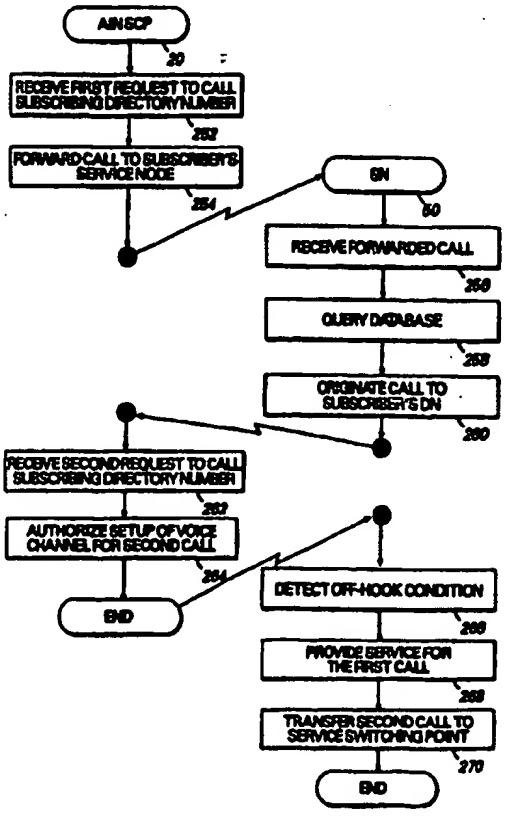
(54) Title: A SYSTEM AND A METHOD TO PROVIDE AN AUDIO CALLING NAME SERVICE IMPLEMENTED THROUGH AN ADVANCED INTELLIGENT NETWORK

(57) Abstract

A system and a method for providing a network-based service with respect to a call associated with an originating and subscribing party. Audio Calling Name and other similar services may be provided as Advanced Intelligent Network (AIN) based services which may be subscribed to similarly to other enhanced services. The preferred embodiment includes an AIN service control point which receives a first request to call a subscriber's directory number (252) and responds by forwarding the call to a service node (254). The service node queries its database (258) to determine the name of the calling party. The service node originates a service call to the subscriber at the same directory number (260) as the first call. The AIN service control point detects and receives a second request to call the subscriber's directory number (262), recognizes the second request as a service call, and authorizes a channel to be established for the service call (264). Upon detecting that the subscriber answered the service call (266), the service node performs the network-based service (268) over the channel and then transfers the first call back to the AIN network (270). The network then completes a voice channel for the first call between the equipment used by the originating party and the subscriber's termination equipment.



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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 97/11066

A. CLASSIFICATION OF SUBJECT MATTER
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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04M H04Q

Documentation searched other than minimumdocumentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	US 5 511 111 A (SERBETCIOGLU BEKIR ET AL) 23 April 1996 see column 10, line 40 - column 11, line 30 see claims 1,2,9,14,21 see figures 4A-4H	12,15,16 9-11,13, 14 1-4
Y A	EP 0 609 016 A (AT & T CORP) 3 August 1994 see page 2, line 45 - page 3, line 8 see page 4, line 57 - page 5, line 24 see page 5, line 45 - page 6, line 9 see figure 1	9-11,13, 14 1-4,7,8

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[X] Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
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European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Neves Appelt, D

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INTERNATIONAL SEARCH REPORT

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PCT/US 97/11066

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 5 309 512 A (BLACKMON LA SHERAL ET AL) 3 May 1994 see column 1, line 61 - column 2, line 44 see column 3, line 52 - column 4, line 27 see claims 1,2,10,11,16 see figures 4,6 ---	1-4, 9-12,15, 16
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